Introduction to Evidence-Based Medicine

Presentation to the Alaska Health Care Commission

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Who killed George Washington?

Where is my Vioxx?

Where is my Vioxx?

What happened to my Merck common stock?

What does this mean?

Post hoc ergo propter hoc.

Up until about 40 years ago, medical decisions were doing very well on their own, or so people thought. The complacency was based on a fundamental assumption that through the rigors of medical education, followed by continuing education, journals, individual experiences, and exposure to colleagues, each physician always thought the right thoughts and did the right things. The idea was that when a physician faced a patient, by some fundamentally human process called the "art of medicine" or "clinical judgment", the physician would synthesize all of the important information about the patient, relevant research, and experiences with previous patients to determine the best course of action.

David M. Eddy

Health Affairs 24 no. 1 (2005)

Question:
If you were a soldier injured on the battlefield when did your chances of survival if you were able to get to a surgeon become just as great as they would have been if you were not able to get to a surgeon for medical care?

Answer:

During the First World War

Medical management led by “expert opinion” or as a result of “consensus conferences” :

- Prevention of purulent otitis media among Alaska Natives
- What is the proper surgery for peptic ulcer disease?
- What is the best surgery for papillary carcinoma of the thyroid gland?

Evidence-based medicine aims to apply the best available evidence gained from the scientific method to medical decision making. It seeks to assess the quality of evidence of the risks and benefits of treatments (including lack of treatment).

Grades of Evidence

US Preventive Services Task Force

- Level I: Evidence obtained from at least one properly designed randomized controlled trial
- Level II-1: Evidence obtained from well-designed controlled trials without randomization
- Level II-2: Evidence obtained from well designed cohort or case-control analytic studies, preferably from more than one center or research group
- Level II-3: Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled trials might also be regarded as this type of evidence
- Level III: Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees

Categories of Recommendations

US Preventive Services Task Force

- Level A: Good scientific evidence suggests that the benefits of the clinical services substantially outweighs the potential risks. Clinicians should discuss the service with eligible patients.
- Level B: At least fair scientific evidence suggests that the benefits of the clinical service outweighs the potential risks. Clinicians should discuss the service with eligible patients.
- Level C: At least fair scientific evidence suggests that there are benefits provided by the clinical service, but the balance between benefits and risks are too close for making general recommendations. Clinicians need not offer it unless there are individual considerations.

Categories of Recommendations

US Preventive Services Task Force (continued)

- Level D: At least fair scientific evidence suggests that the risks of the clinical service outweighs potential benefits. Clinicians should not routinely offer the service to patients.
- Level I: Scientific evidence is lacking, of poor quality, or conflicting, such that the risk versus benefit balance cannot be assessed. Clinicians should help patients understand the uncertainty surrounding the clinical service.

Application of EBM

- Evidence-based guidelines (EBG) is the practice of evidence-based medicine at the organizational or institutional level. This includes the production of guidelines, policy, and regulations. This approach has also been called evidence based healthcare.
- Evidence-based individual decision (EBID) making is evidence-based medicine as practiced by the individual health care provider.

EBM Pioneers

Examples

- Archie Cochrane – Scottish Epidemiologist – Published *Effectiveness and Efficiency: Random Reflections on Health Services* (1972)
- David Sackett & Gordon Guyatt – Canadians – McMaster University
- David Eddy – USA – Duke University, Kaiser Permanente – first used term "Evidence Based" in 1990
- Anna Gordon – Australian – Founded BMJ's *Clinical Evidence,* the *Journal of Evidence Based Healthcare,* and *Evidence Based Policy*
- John Wennberg – USA – Dartmouth – Leading researcher in unwarranted variation in the healthcare industry. Founded Center for Evaluative Clinical Services in 1988

Resources

- Organizational Technology Evaluation Committees
- Cochrane Collaboration and Library
- Hayes, Inc. – Directories, reviews, briefs, research
- Technology Evaluation Center – Blue Cross Blue Shield Association and Kaiser
- Delfini – Assistance with how organizations can become an evidence based system capable of finding and closing quality and cost gaps.

Questions?

Anatomy of an Article

Title – Useful to determine relevance

Abstract – Only useful for deciding you want to review the study – data is often not verifiable in body of article!

Body – Critically appraise key elements of the study e.g., population, methodology, possible biases, etc.

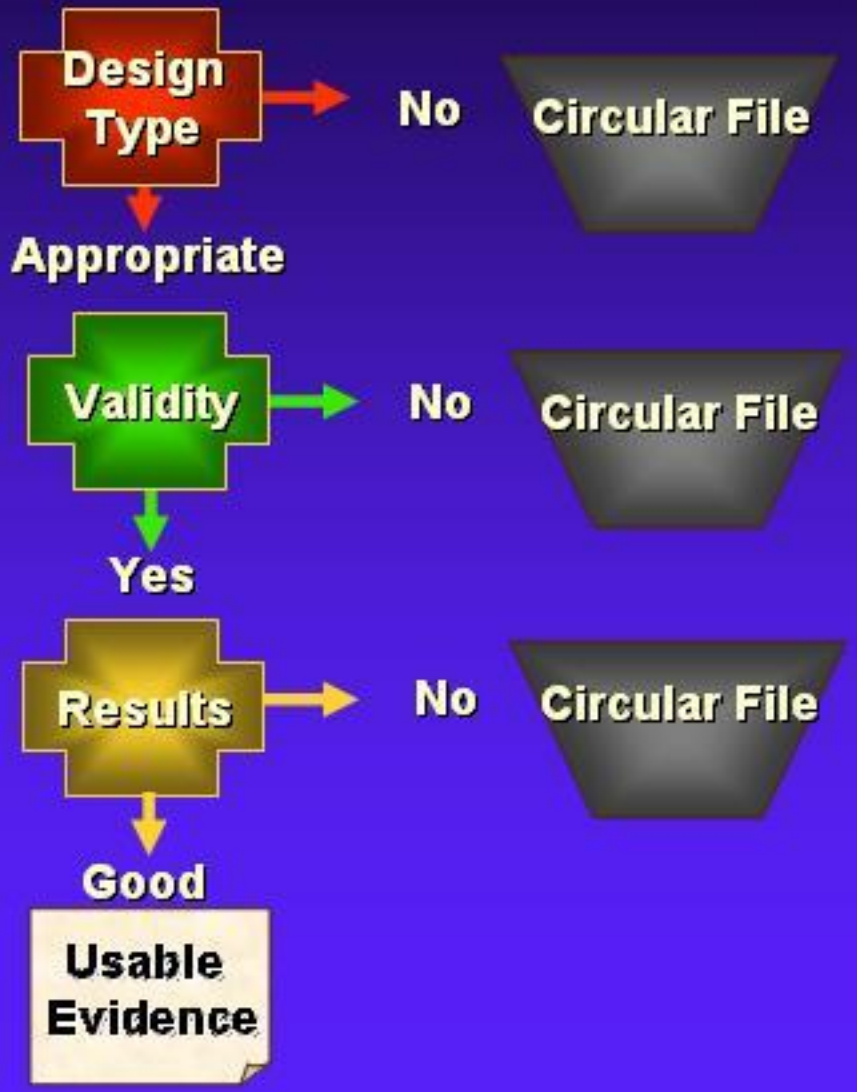
Tables – Highly useful (be sure to look for baseline comparisons, for example)

Results – Vital importance (*if* study is valid!!!)

Conclusions – NOT evidence! This is opinion

Acquire & Appraise: 3 Steps to "Usable Evidence"

- 1. What is the best kind of **study design** to answer my question?
- 2. Now that I have found studies with the right design, how well are the studies done – are they **valid**?
- 3. Now that I have found valid studies with the right design, how useful are the **results**?



The Hunt for the "Best Available" Evidence: Filtering for Strength of Study Design

Evidence Grading

Nat Hx
Prognosis
Dx (RCT best)

Therapy
Screening
Prevention
Dx (best)

Expert opinion
Narrative Reviews

Observations (non-experiments):
Cohort
Cross-sectional
Case/Control

Experiments:
Randomized
Controlled Trials

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Increased accuracy in predicting results

Descriptions
• Case series*

Experiments:
Non-randomized
Controlled Trials

*Unless "all or none" results and still bias potential